## What is claimed is:

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- An assay for diagnosing whether a subject has or is 1. predisposed to developing a neoplastic disease which comprises:
  - obtaining a biological sample from a a) first subject;
  - contacting the sample with an agent capable of b) detecting the amount of soluble neuregulin receptor in the sample;
  - measuring the amount of agent bound by the C) sample;
  - comparing the amount of agent bound measured in d) step c) with the the amount of agent bound by a sample which is from a second subject without neoplastic disease, a higher amount bound by the sample from the first subject being indicative of the first subject having or being predisposed to developing a neoplastic disease.

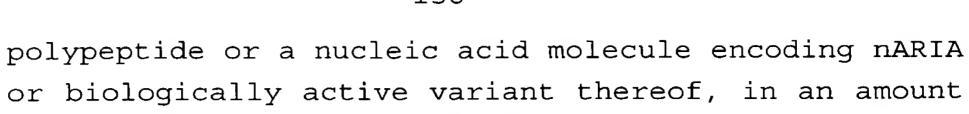
An assay for determining whether a subject has a 2. neurodegenerative disease which comprises:

- obtaining a biological sample from the subject; a)
- contacting the sample with an agent that detects b) the presence of an extracellular domain of nARIA (CRD-neuregulin) or an agent which detects the presence of soluble neuregulin receptor;
- measuring the amount of agent bound by the C) sample;
- comparing the amount of bound agent measured in d) step c) with the the amount of agent bound by a standard normal sample, a higher amount or a lower amount bound by the sample from the subject being indicative of the subject having a neurodegenerative disease.

- 3. The assay of claim 1 or 2, wherein the agent is an antibody or a fragment thereof, a cell which expresses neuregulin which has a cytoplasmic tail linked to a detectable label; or a cell which expresses neuregulin receptor.
- 4. The assay of claim 1 or 2, wherein the sample is cerebrospinal fluid (CSF), blood, plasma, sputum, amniotic fluid, ascites fluid, breast aspirate, saliva, urine, lung lavage, or cell lysate or extract derived from a biopsy.
  - 5. The assay of claim 1 or 2, wherein sample further comprises soluble her 4 receptor.
- 6. The assay of claim 1 or 2, wherein the agent is an antibody which binds to an epitope of the cytoplasmic domain of nARIA.
- 7. The assay of claim 1 or 2, wherein the agent is a HEK cell stably transfected with neuregulin with a cytoplasmic tail detectably labelled.
- 8. The assay of claim 1, wherein the neoplastic disease is breast cancer, prostate cancer, brain cancer or ovarian cancer.
- 9. The assay of claim 2, wherein the neurodegenerative disease is Alzheimer's Disease, Parkinson's disease,

  Turrets Syndrome, amyotrophic lateral sclerosis, Pick's disease, myasthenia gravis, or senility.
- 10. A method for maintaining or sustaining a synaptic connection between a neuron and a target cell comprising contacting the target cell with an nARIA

sufficient to maintain the synaptic connection.



- 5 11. A method for treating neurodegeneration in a subject comprising contacting the target cell with an nARIA polypeptide or a nucleic acid molecule encoding nARIA or biologically active variant thereof, in an amount sufficient to maintain synaptic connections in the subject and thereby treat neurodegeneration in the subject.
- 12. The method of claim 10 or 11, wherein the target cell is a somatic cell including a myocyte, a neuronal cell, a glandular cell or any postsynaptic cell.
  - 13. The method of claim 10 or 11, wherein maintenance of the synaptic junction is accomplished in an individual having a neurological disorder involving abnormal synaptic connections.
  - 14. The method of claim 10, wherein the neurological disorder is a neuromuscular disorder or a neurodegenerative disease.
  - 15. The method of claim 10 or 11, wherein the nARIA polypeptide terminates with the amino acid sequence NQDPIAV (Seq ID No. \_\_) or the A-form of the cytoplamic domain of nARIA (Seq ID No. \_\_).
    - 16. The method of claim 10, wherein the neurological disorder is Alzheimer's Disease, Parkinson's disease, Turrets Syndrome, amyotrophic lateral sclerosis, Pick's disease, myasthenia gravis, or senility.

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- 17. A method for inducing neuronal regeneration which comprises contacting a target cell with a composition of nARIA and a pharmaceutically acceptable carrier to induce the formation of a synaptic junction between a neuron and a target cell.
- 18. The method of claim 17, wherein the target cell is a neuronal cell or a muscle cell.
- 19. A method for treating a neoplastic condition in a subject which comprises administering to the subject a pharmaceutically acceptable form of nARIA or a nARIA antagonist, which inhibits an interaction between nARIA and its receptor, in a sufficient amount over a sufficient time period to induce differentiation of neoplastic cells and thus treat the neoplastic condition.
- 20. A method for determining whether a compound is capable of modulating the binding of an nARIA polypeptide to its receptor, which comprises:
  - (a) incubating the compound under suitable conditions with an appropriate nARIA polypeptide-affinity derivative or receptor-affinity derivative under appropriate conditions such that an affinity complex may form;
- (b) measuring the amount of affinity complex formed so as to determine whether the compound is capable of modulating the binding of the nARIA polypeptide to its receptor.
- 21. The method of claim 20, wherein the affinity complex comprises an nARIA receptor bound to an affinity

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derivative.

- 22. The method of claim 20, wherein the affinity complex comprises an nARIA polypeptide bound to an affinity derivative.
- 23. The method of claim 20, wherein measuring comprises binding of an antibody specific for nARIA to the affinity complex to measure the amount of affinity complex formed.
- The method of claim 20, wherein the affinity derivative comprises sephanose, cellulose, plastic, glass, glass beads, or a streptavidin-coated plastic.
- 25. An assay for detecting neoplastic disease in a subject which comprises:
  - a) obtaining a biological sample from the subject;
  - b) contacting the sample with an agent that specifically binds to an expression product of a neuregulin gene or a neuregulin receptor;
  - c) measuring the amount of agent bound by the sample;
- d) comparing the amount of agent bound measured in step c) with the the amount of agent bound by a standard normal sample, a higher amount bound by the sample from the subject being indicative of the presence of neoplastic disease in the subject.
  - 26. The method of claim 25, wherein the neuregulin receptor is erbB2, erbB3 or erbB4.
- The method of claim 25, wherein the agent specifically binds to an amino acid sequence of neuregulin which

directs translocation to the nucleus.

- 28. The method of claim 25, wherein an expression product of a neuregulin gene comprises a neuregulin protein, an extracellular domain of a neuregulin protein, or a polypeptide encoded by the amino acid sequence shown in Figure 2 or 4.
- 29. The assay of claim 1, 2 or 25, wherein the agent is detectably labelled.

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